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PROVISIONAL SPECIFICATION.



Improvements in the Indicating Scales and Indexes of Electrical Apparatus.

I, AVY FREDERICK MONEY HICKS, of 97, Kenilworth Avenue, Wimbledon Park, S.W. 19, a British Subject, do hereby declare the nature of this invention to be as follows:—

This invention relates to scales, indexes, protractors and like means adapted to indicate the relative linear or radial positions of the controlling means of scientific apparatus, machines and the like.

The object of the invention is to provide an improved scale of simple construction by the use of which greater accuracy may be obtained than with a scale of the usual type.

In a known type of scale and index for indicating the relative position of two members, a hair line, slotted frame or other form of index attached to, or otherwise movable with the one member is adapted to indicate or to be read in conjunction with a series of calibrated lines or graduations attached to, or movable with the other member, the hair line extending in a direction parallel with a calibrated line or graduation corresponding to the position of the hair line or other index.

In a scale and index according to the invention, however, the hair line, slotted frame or other index is arranged so as to be inclined to a calibrated line or graduation corresponding with the position of the hair line or other index, so that the position of a point of intersection of the index and one of the calibrated lines or graduations is a measure of that portion of the actual indicated quantity in excess of a definitely indicated quantity of lower value.

In order to facilitate the estimation of the fractional quantity indicated by the point or points of intersection of the index and one or more of said calibrated lines or graduations there may be provided a number of lines extending along the scale, each parallel with the direction of relative motion of the scale and index, and suitably spaced along the lengths of the calibrated lines or graduations.

Alternatively, indicating lines may be spaced along the length of the index to

determine the value of the fractional quantity indicated by the point or points of intersection of the index and one or more calibrated lines or graduations.

In a form of scale according to the invention suitable more especially for use on the drum controls of wireless apparatus, the scale is in the form of a strip formed at its ends with slots in order that it may be secured around the control drum in the known manner. A dividing line extends longitudinally of the strip and parallel with its edges to divide the width of the strip into two unequal portions the wider being engraved with graduations according to the invention and the narrower being adapted to receive suitable indicating numerals. The graduations comprise a number of parallel lines extending obliquely across the wider portion of the strip to the outer edge thereof, the inclination of said lines being such that one end of each line is disposed along the length of said scale at a position in advance of the other end of said line by an amount equal to the distance between one line and the next adjacent line measured longitudinally of the scale.

The total length of the graduations, the numerals and the number of transverse lines employed are such that when the scale is in position upon the control drum the indications thereon denote the correct angular position of said drum, the line indicating every tenth degree or division preferably being thickened for ease in reading the scale. Each of the transverse lines is divided into a predetermined number of parts by further longitudinal parallel lines arranged in equally spaced formation across the width of the wider portion of the strip.

For use with this form of scale the index comprises preferably a hair line disposed adjacent to the scale and parallel with the axis of the control drum.

Thus when the index is positioned over the "lower" end (i.e. the end of lower value) of any transverse line the reading is exactly equal to the numerical value shown in connection with said line. When, however, this is not so and the index intersects one of the transverse lines

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intermediately in its length, the reading is greater than the numerical value of said line by the fraction of a division equal to that fraction of the length of a transverse line, between the point of intersection and the "lower" end of the line intersected by the index.

In another form of scale, transverse lines may be arranged parallel with the axis of the drum the index in this case being at a suitable inclination to said transverse lines in order that the required vernier effect may be obtained; also in both cases the parallel lines or marks which divide the transverse lines into the required number of divisions may conveniently be marked upon the index line.

The invention is also applicable to scales such as protractors and other circular dials in which the scale graduations are disposed either in a plane or a conical surface, the lines indicating the fractions of a division in connection with the points of intersection being in this case in the form of concentric circles and, if necessary, being unequally spaced one from another in order that correct fractional readings may be obtained with a straight index line. If desired, however, said concentric circles may be equally or other-

wise spaced one from another, the index lines and/or the graduation lines being of curved formation in order that accurate readings may be obtained, this curvature being necessary owing to the divergence of the graduation lines from the centre of rotation.

It will be observed that a scale according to the invention is particularly applicable for use with wireless apparatus where, although accurate proportional readings are not essential, it is often desirable to read off and to reproduce exactly a given set of readings; consequently, for this purpose, a simple and inexpensive scale is quite satisfactory.

The invention is applicable to accurate measuring and indicating scales such as those on micrometers, tool slides and the like, in which cases, oblique indexes and/or or obliquely engraved graduations may be used instead of, or in conjunction with the usual type of auxiliary vernier scale.

Dated this 14th day of May, 1930.

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COMPLETE SPECIFICATION.

Improvements in the Indicating Scales and Indexes of Electrical Apparatus.

I, AVY FREDERICK MONEY HICKS, of 97, Kenilworth Avenue, Wimbledon Park, S.W. 19, a British Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to scales and indexes of wireless, and similar electrical apparatus, of the kind in which a hair line or equivalent is mounted for movement relative to calibrations or graduations on a linear or angular scale.

The object of the present invention is to provide an improved form of indicator by which accurate readings and re-settings may readily be obtained, while the device according to the invention is no more complicated than the usual form of scale and index.

It has already been proposed to use in connection with weighing machines, scales and indexes arranged so that a hair-line is inclined to the scale calibrations or graduations so as to intersect the latter, secondary indications or divisions being

provided for reading fractions of a main scale division. Scales of a similar nature are also known in connection with surveying instruments, while it has previously been proposed to provide in wireless apparatus an obliquely disposed index which intersects simultaneously a large number of scale divisions so that a line may be plotted substantially longitudinally of the scale for the purpose of obtaining accurate correspondence between the scale indications and the capacity value or equivalent of the instrument in connection with which the scale is used.

According to the invention, in a scale and index of the kind referred to, the hair line is inclined to the calibrations or graduations and is arranged to intersect the latter, secondary indications or divisions being provided for reading off fractions of a main scale division. Preferably the hair line is marked upon a transparent sheet forming a window in front of the scale, said window bearing also the secondary divisions, and figures being marked thereon for indicating the

values of the secondary divisions. Either the hair line or the scale divisions may be disposed at right angles to the direction of relative motion.

5 The invention is illustrated diagrammatically in the accompanying drawings, in which:

10 Figure 1 shows a form of calibration suitable more especially for the well known drum control of wireless apparatus;

Figures 2 and 3 show modified forms of scale and an index;

15 Figure 4 shows the application of the invention to a radial scale; and

Figure 5 shows a modified form of graduation and index.

20 The forms shown in Figures 1, 2 and 3 are more particularly suitable for use on the drum controls of wireless apparatus, in which a panel, indicated at 40, is formed with a rectangular aperture 41 which is usually provided with a transparent cover or window through which a portion of the periphery of an indicating drum 42 is shown to view.

25 As shown in Figure 1, the aperture 41 is provided with a cross wire or similar form of index 43 which extends parallel with the axis of the drum 42. The peripheral surface of the latter is calibrated in degrees or other units by means of lines 44 which, although parallel with one another, are inclined or spirally arranged around the outer surface of the drum 42. By this means a diagonal scale effect is produced in connection with the cross-wire 43, so that the setting of the drum 42 relative to said cross wire 43 may be determined accurately by noting the position at which the appropriate line 44 intersects the cross wire 43. Thus, in the setting shown in Figure 1, it will readily be observed, that the reading is rather more 35 than "26" and by glancing along that line 44 which corresponds to "26", the amount in excess of this reading, i.e. 0.5 may be ascertained. In order to facilitate this reading, however, the axial width of the drum 42 is divided up by means of circumferential lines 45, and since in the example the width of the drum 42 is divided into ten equal portions, it follows that readings may be 40 taken to one-tenth of an angular unit represented by the divisions between consecutive lines 44.

45 A modified form is shown in Figure 2 in which a hair line 46 is itself divided along its length by lines 47 for determining the axial position of the point of intersection of the lines 44 with the hair line 46.

50 A further modification is shown in Figure 3, in which the lines 44 upon the drum 42 are arranged so as to extend

parallel with the axis thereof, the hair line or other index 48 in this case being inclined so as to produce substantially the same effect as before, and dividing lines 47 being provided in connection with said index 48 for the purpose of indicating the fractional or decimal reading of an angular unit. For scales according to the invention any suitable construction may be employed, the scales in the case of drum controls being preferably in the form of engraved strips adapted to be secured around the peripheral surface of the drum.

55 A radial or protractor scale is shown in Figure 4 in which the hair line 49 is arranged so as to extend radially from the pivotal centre of an indicating frame 50, the lines 51 being arranged each at an angle to the corresponding radius in order that a point of intersection with the cross wire 49 may be obtained. The decimal readings of an angular unit are obtained from the dividing lines 52 in connection with the cross wire or index 49, and it will be observed that with this form of division it may be necessary in some cases for the lines 52 to be unequally spaced along the length, or a portion of the length, of the cross wire or index 49.

60 Although, as shown in Figures 1 to 4, the lines 44 or 51 are arranged so that a length of the cross wire or index corresponding with the width of the main calibrated scale is divided to provide fractional indications, it will be readily appreciated that for the sake of clearness and easy reading, the calibrations 44 may extend beyond the divided portion of the cross wire or index 43 so that the readings 0, 5, 10 as shown in Figure 5, may be quite clear from the end portions of the lines 44.

65 It will be understood that various modifications may be made without departing from the invention. Thus in the angular form of scale, concentric circles may be employed for indicating the points of intersection, these being equally or otherwise spaced one from another, the index lines and/or the graduation lines being of curved formation in order that accurate readings may be obtained, this curvature being necessary owing to the divergence of the graduation lines from the centre of rotation.

70 It will be observed that a scale according to the invention is particularly applicable for use with wireless apparatus, where, although accurate proportional readings are not essential, it is often desirable to read off and to reproduce exactly a given set of readings; for this purpose, therefore, a simple and inexpensive scale is quite satisfactory.

75 Having now particularly described and ascertained the nature of my said inven-

tion and in what manner the same is to be performed, I declare that what I claim is:—

- 5 1. A scale and index for wireless and similar electrical apparatus wherein a hair line is inclined to the scale calibrations or graduations and is arranged to intersect the latter, secondary indications or divisions being provided for reading fractions of a main scale division.
- 10 2. A scale and index as claimed in Claim 1 wherein the hair line is marked upon a transparent sheet forming a window in front of the scale.
- 15 3. A scale and index as claimed in Claim 2 wherein the window is marked with secondary divisions and figures for indicating the values thereof.
- 20 4. A scale and index as claimed in any preceding claim wherein the hair line is disposed at right angles to the direction of relative motion.
5. A scale and index as claimed in any

of Claims 1 to 4, wherein the scale divisions are interposed at right angles to the direction of relative motion. 25

6. An improved drum scale and index for wireless and similar electrical apparatus substantially as described with reference to Figures 1 to 3 of the accompanying drawings. 30

7. An improved angular scale and index for wireless and similar electrical apparatus substantially as described with reference to Figure 4 of the accompanying drawings. 35

Dated this 14th day of February, 1931.

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Reference has been directed, in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts, 1907 to 1928, to Specifications Nos. 319,209, 24,349 of 1907, 27,108 of 1905 and 15,026 of 1897.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

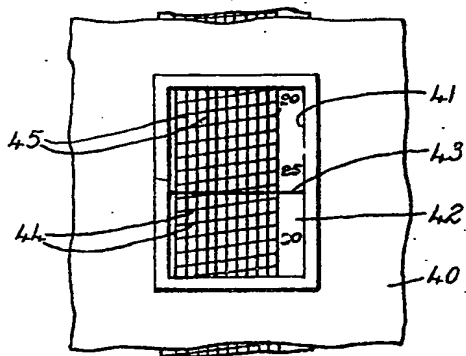


Fig. 2.

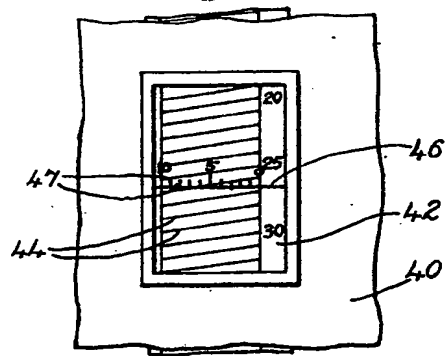


Fig. 3.

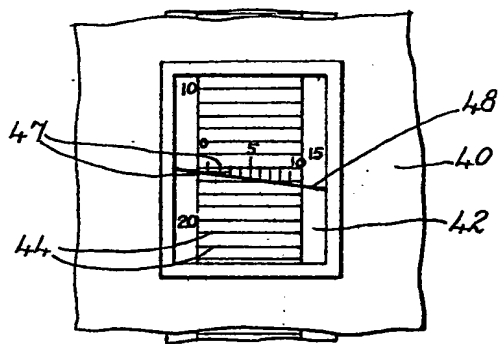


Fig. 4.

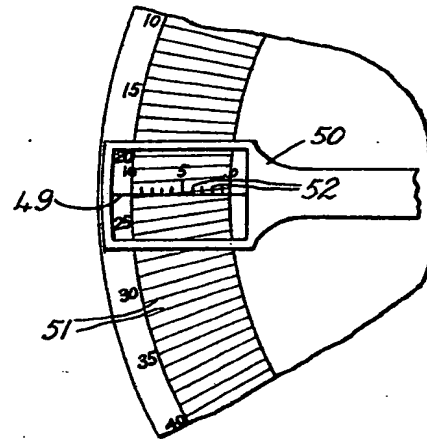


Fig. 5.

